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16. (amended) A method of fabricating a semiconductor device, comprising:
attaching a semiconductor die to a substrate having a plurality of leads and
a plurality of interposer pads arranged around said die;
coupling the die to the plurality of interposer pads with a first plurality of
bonding wires ball bonded to said die and stitch bonded to said interposer pads;
and
coupling the plurality of interposer pads to the plurality of leads with a
second plurality of bonding wires ball bonded to said interposer pads and stitch
bonded to said leads.

A5

22. (new) The semiconductor device as recited in Claim 8, wherein said bonding
wires are continuous between said balls bonds on said die and said stitch bonds
on said leads, and further wherein said continuous wires are attached to said
interposer pads with a ball bond.

REMARKS

Reconsideration of the above-referenced application in view of the
amendments and the following remarks is respectfully requested.

Claims 1-21 are pending in this case. Claim 3 has been cancelled. New Claim
22 has been added.

Claims 1-21 stand rejected under 35 U.S.C. 112, first paragraph.
Specifically, the Examiner asserts that the structure of the interposer substrate is
unclear. Applicant submits that the existence of a substrate is clearly implied in
the drawings. However, a proposed modification to the drawings is included
herewith to show that the die, leads, and interposer pads are supported on a
substrate in both prior art Figures 1 and 3, as well as in the embodiments of the
invention shown in Figures 2, 4, 5, and 6. Support for the drawing modifications

can be found on page 2 of the specification in the "Summary of Invention" section, where the interposer pads are described as being "on an electro-less substrate between the semiconductor die and the lead." Regarding the term "electroless", Applicant submits that the term taken literally means "insulating." Thus, the die, leads, and interposer pads are formed on an insulating substrate, which is known in the art.

The Examiner also asserts that the specification does not support the term "ball grid array." However, the skilled artisan will appreciate that Figures 5 and 6 are top views of an insulating substrate, the underside of which includes pads coupled to leads 15 and 25 in Figure 5 and to leads 65 and 15 in Figure 6. Figures 1 to 4 have been modified accordingly. It is known in the art to form solder balls on such pads. As stated in the specification, leads 15, 25, and 65 are only representative of the many such leads formed on the substrate. Hence, the underside of the substrate includes many such corresponding pads to which solder balls may be attached; hence, the term "ball grid array."

not shown necessary

In view of the electroless or insulating nature of the substrate, the interposer pad is "electrically floating" by virtue of being located on the insulating substrate, a fact which would be appreciated by the skilled artisan.

no

Figure 4 shows a single bond wire comprising two sections (20 and 24). Ball bond 23 attaches the wire to the interposer pad 21. Note the differences between the ball bonds and wires on the interposer pad 21 shown in Figures 2 and 4. Figure 2 clearly includes a ball bond 23 on top of the stitch bond used to attach wire 20 to pad 21. Whereas in Figure 4, the ball bond 23 is formed on the wire (note that wire 24 does not emanate from the top of ball 23 as it does in Figure 2).

new figures not old

Regarding the "plurality of interposer pads", Figure 6 shows two interposer pads 21 and 63 which form a plurality.

Claim 3 stands rejected under 35 U.S.C. 112, second paragraph. Claim 3 has been cancelled. The rejection of Claim 3 is therefore moot.

Claims 1-21 stand rejected under 35 U.S.C. 102(e) as being anticipated by Schmidt, et al. Claim 1, as amended, includes the steps of "attaching a first end of a first bonding wire to a semiconductor die with a ball bond; attaching a second end of the first bonding wire to an interposer pad with a stitch bond; attaching a first end of a second bonding wire to the interposer pad with a ball bond; and attaching the second end of the second bonding wire to the lead with a stitch bond." Support for the amendments can be found on page 4 of the specification at lines 6-8. Schmidt teaches away from the claimed invention by forming only ball bonds ("welds" in Schmidt's terminology) on his leads 3 and only stitch (or "wedge") bonds on connection surfaces 4. In col. 4, lines 30-37, Schmidt states that this is done to save space on leads 3. In view of this teaching away, Applicant respectfully submits that Claim 1, as amended, as well as Claims 2 and 4-7 which depend therefrom, are patentable over Schmidt.

Claim 8, as amended, includes the feature of "a plurality of bonding wires attached to the semiconductor die with ball bonds and to the leads with stitch bonds, said wires attached to said interposer pads." As indicated above, Schmidt does not disclose such a feature. In fact, Schmidt teaches away from forming stitch bonds on leads. Therefore, Applicant submits that Claim 8 and Claims 9-15 and 22 which depend therefrom are patentable over Schmidt.

Claim 16, as amended, includes the steps of "coupling the die to the plurality of interposer pads with a first plurality of bonding wires ball bonded to said die and stitch bonded to said interposer pads; and coupling the plurality of interposer pads to the plurality of leads with a second plurality of bonding wires ball bonded to said interposer pads and stitch bonded to said leads." As indicated above, Schmidt does not teach or suggest such steps. Therefore, Applicant submits that Claim 16, as well as Claims 17-21 which depend therefrom, are patentable over Schmidt.

Applicant respectfully requests reconsideration and withdrawal of the rejections and allowance of Claims 1, 2, and 4-22. If the Examiner has any questions or other correspondence regarding this application, Applicant requests

that the Examiner contact Applicant's attorney at the below listed telephone number and address.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'M. Skrehot', written in a cursive style.

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Version with Markings to Show Changes Made

In the Claims:

Please amend the claims as follows:

1. (amended) A method and system of wire bonding a semiconductor die to a lead, comprising steps of:

attaching a first end of a first bonding wire to a semiconductor die with a ball bond;

attaching a second end of the first bonding wire to an interposer pad with a stitch bond;

attaching a first end of a second bonding wire to the interposer pad with a ball bond; and

attaching the second end of the second bonding wire to the lead with a stitch bond.

3. (cancelled)

8. (amended) A semiconductor device, comprising:

a semiconductor die disposed on a substrate [in a semiconductor package];

a plurality of interposer pads on said [a] substrate [integral to the semiconductor package];

a plurality of leads on the substrate [integral to the semiconductor package];

a plurality of bonding wires attached to [from] the semiconductor die with ball bonds and [to the interposer pads and from the interposer pads] to the leads with stitch bonds, said wires attached to said interposer pads [, each interposer pad operable to accept a bonding wire from the die and each lead being operable to accept a bonding wire from each interposer pad].

11. (amended) The semiconductor device as recited in Claim 8, wherein each of said bonding wires comprises a [each] bonding wire between the semiconductor die and each interposer pad [is] attached to a bonding pad on the semiconductor die with a ball bond and to said interposer pad with a stitch bond and a [each] bonding wire between the interposer pad and the lead [is] attached to [a ball bond on] the interposer pad with a ball bond and to each lead with a stitch bond.

16. (amended) A method of fabricating a semiconductor device, comprising:
attaching a semiconductor die to a substrate [having input, output, supply and ground nodes, to a semiconductor package] having a plurality of leads and a plurality of interposer pads arranged around said die;

coupling the [input, output, supply and ground nodes on the semiconductor] die to the plurality of interposer pads with a first plurality of bonding wires ball bonded to said die and stitch bonded to said interposer pads;
and

coupling the plurality of interposer pads to the plurality of leads with a second plurality of bonding wires ball bonded to said interposer pads and stitch bonded to said leads.

22. (new) The semiconductor device as recited in Claim 8, wherein said bonding wires are continuous between said balls bonds on said die and said stitch bonds on said leads, and further wherein said continuous wires are attached to said interposer pads with a ball bond.

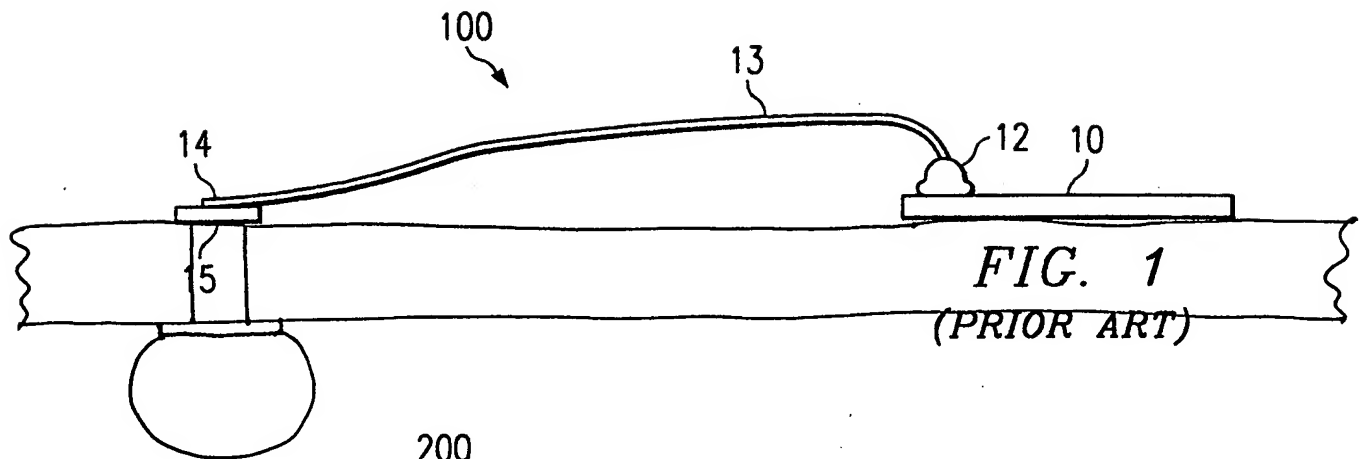


FIG. 1
(PRIOR ART)

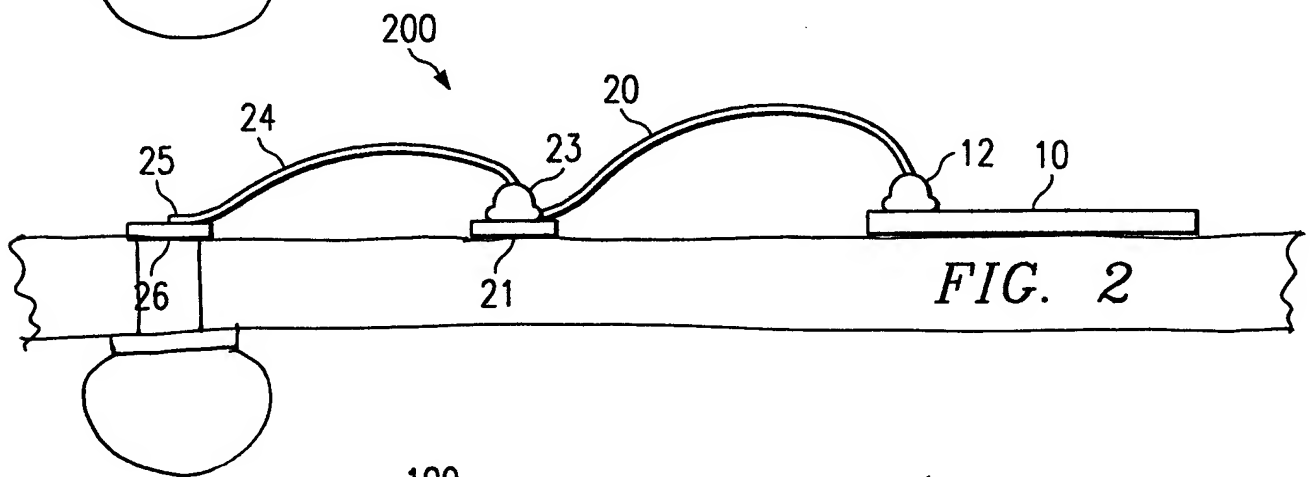


FIG. 2

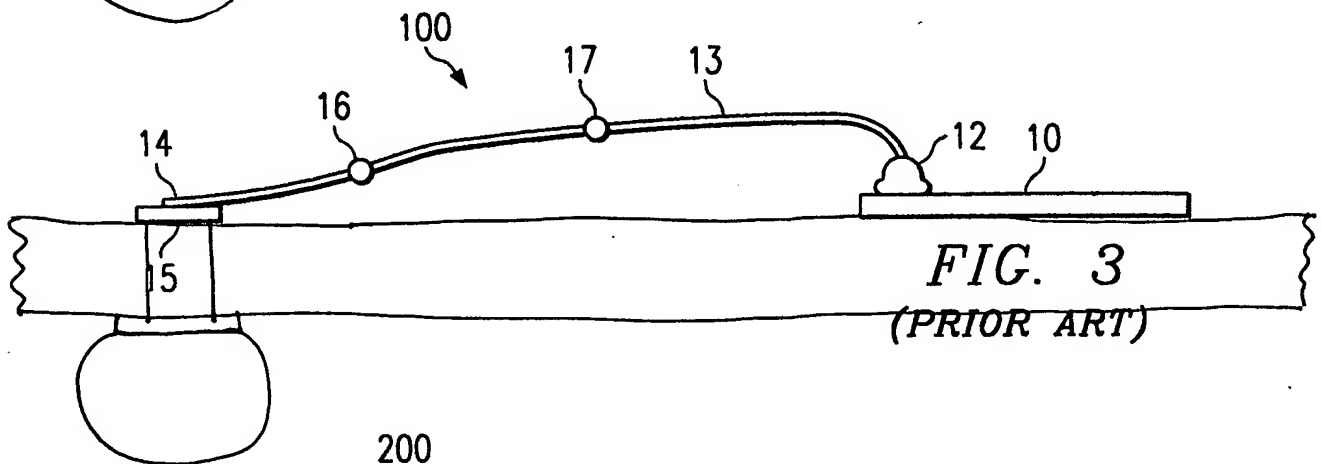


FIG. 3
(PRIOR ART)

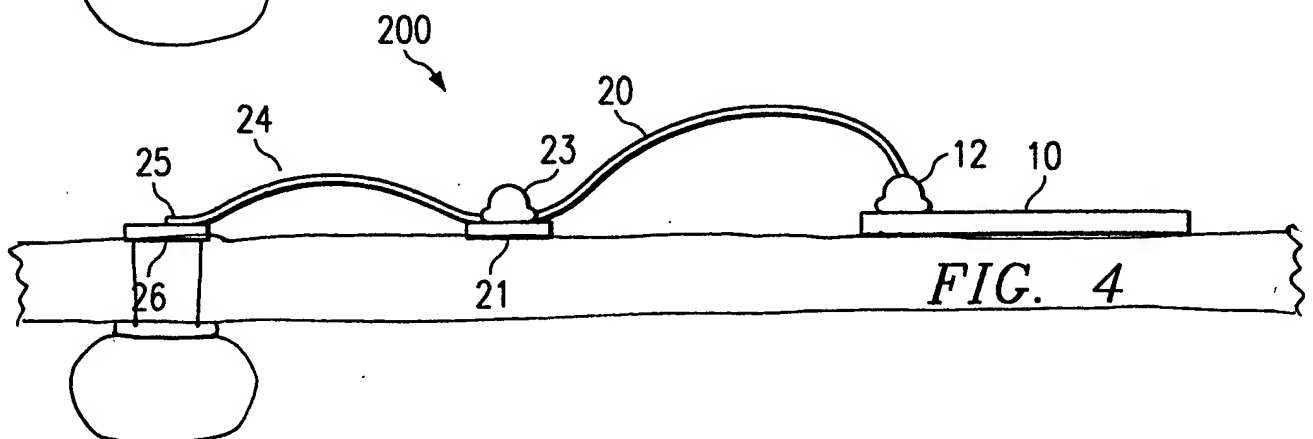


FIG. 4

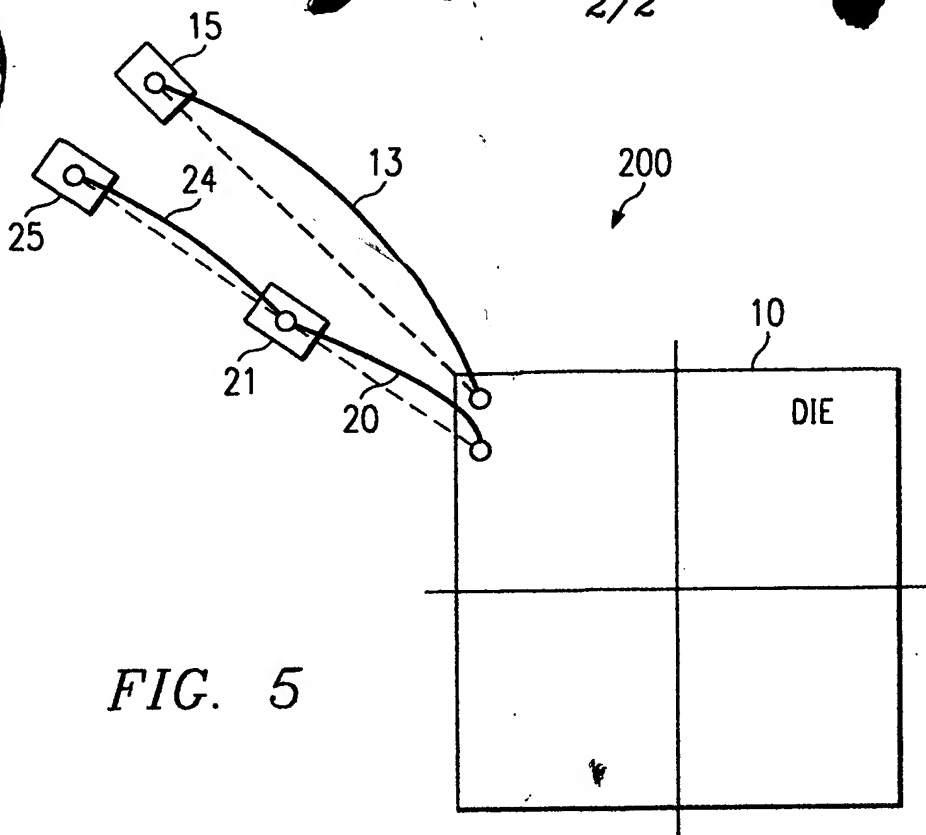


FIG. 5

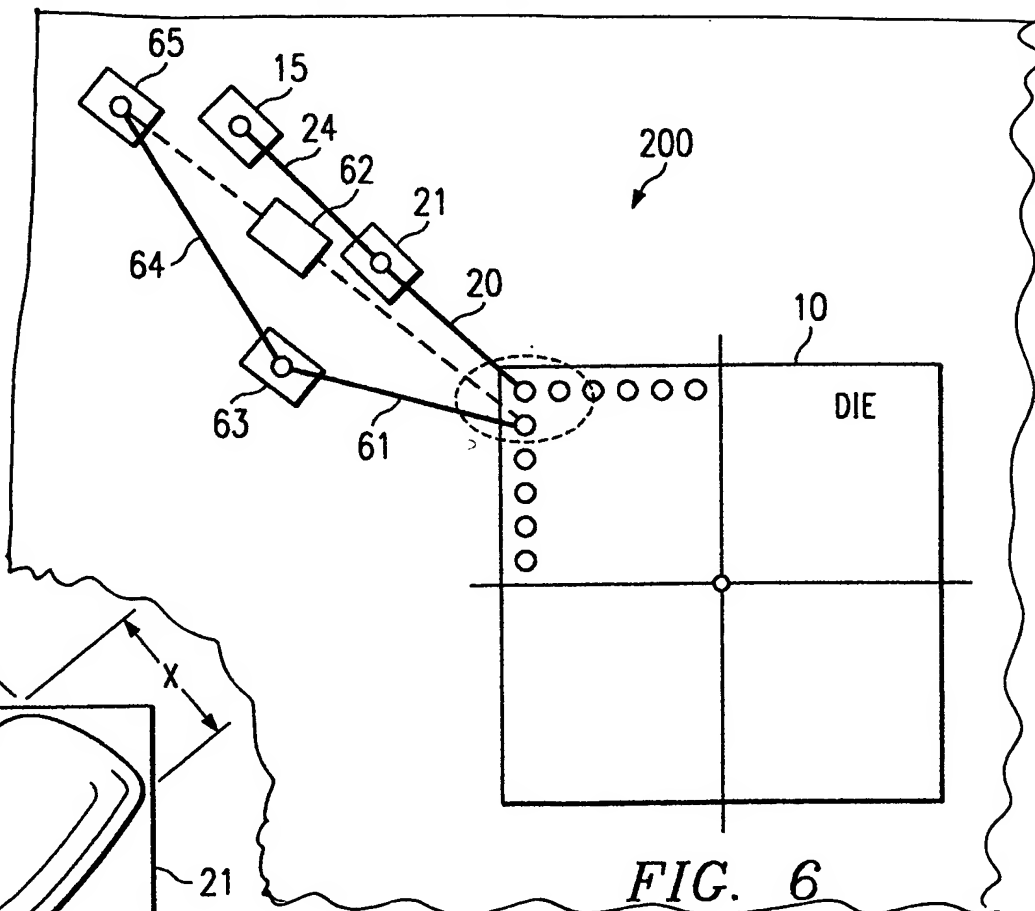


FIG. 6

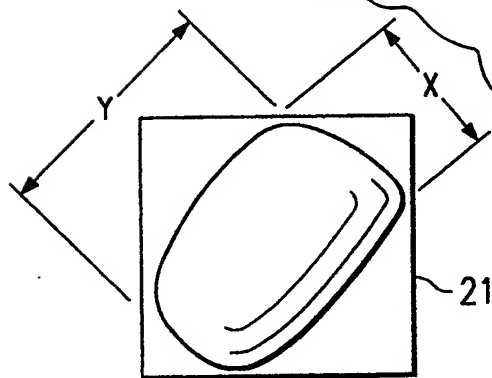


FIG. 7